Spin Duality Analysis

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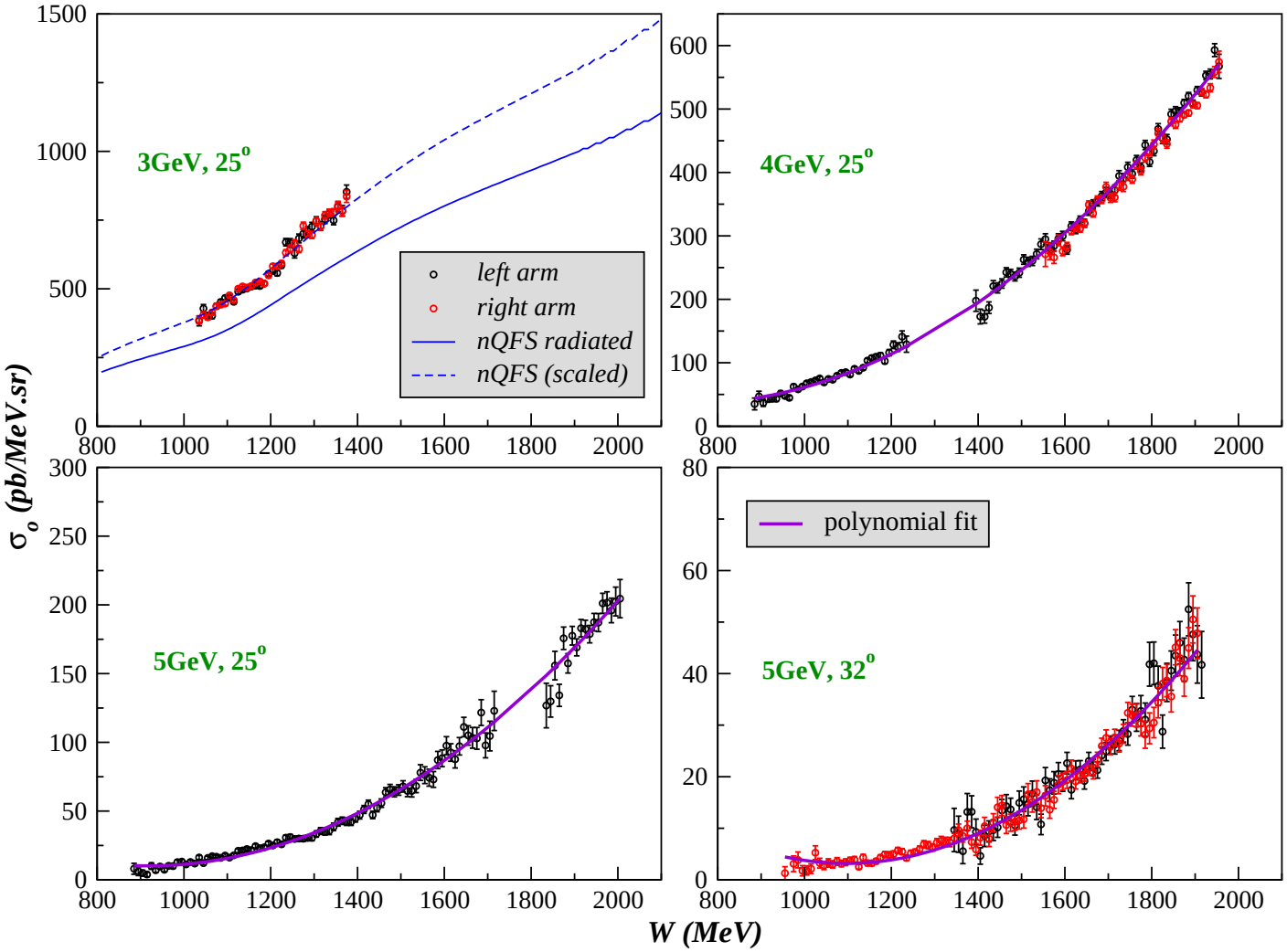
Polarized ^{3}He Collaboration Meeting
July 22, 2005

Outline

- Nitrogen dilution
- Radiative corrections
- Preliminary results for ^{3}He

Nitrogen cross sections

- Generated N_2 unpolarized cross sections with same cuts as for ^{3}He.
- For missing kinematics, used either scaled QFS or polynomial fit.

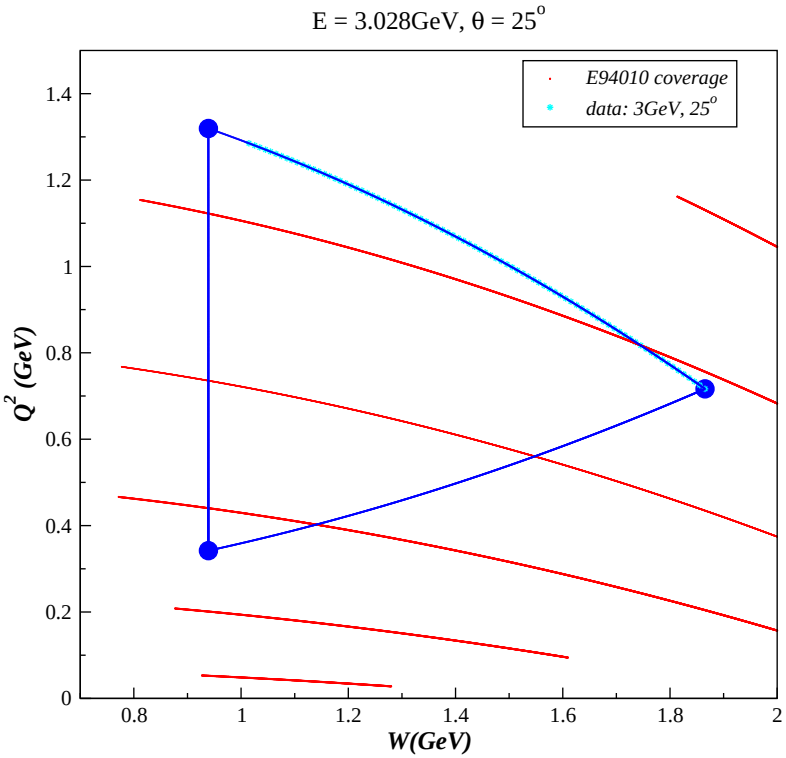


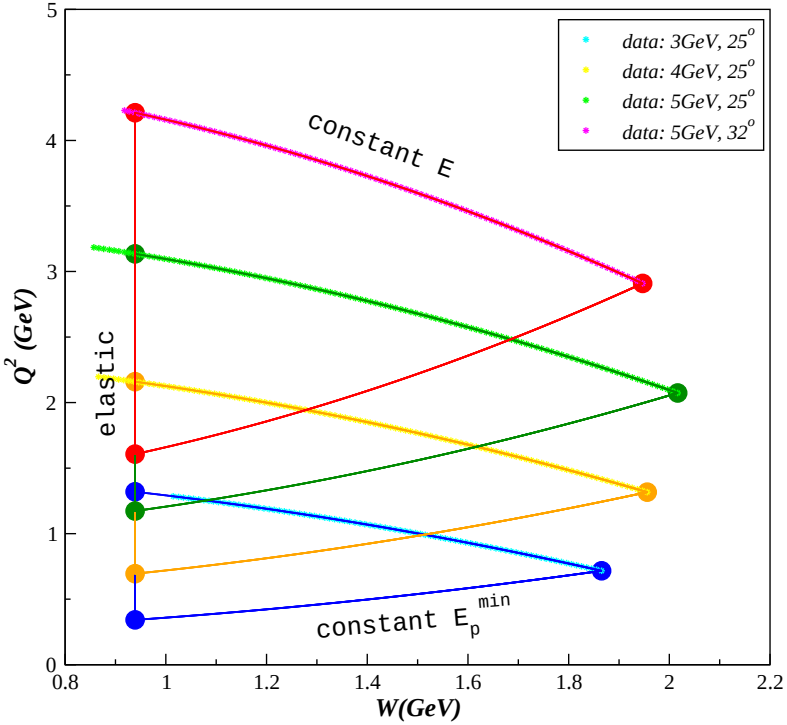
Radiative corrections

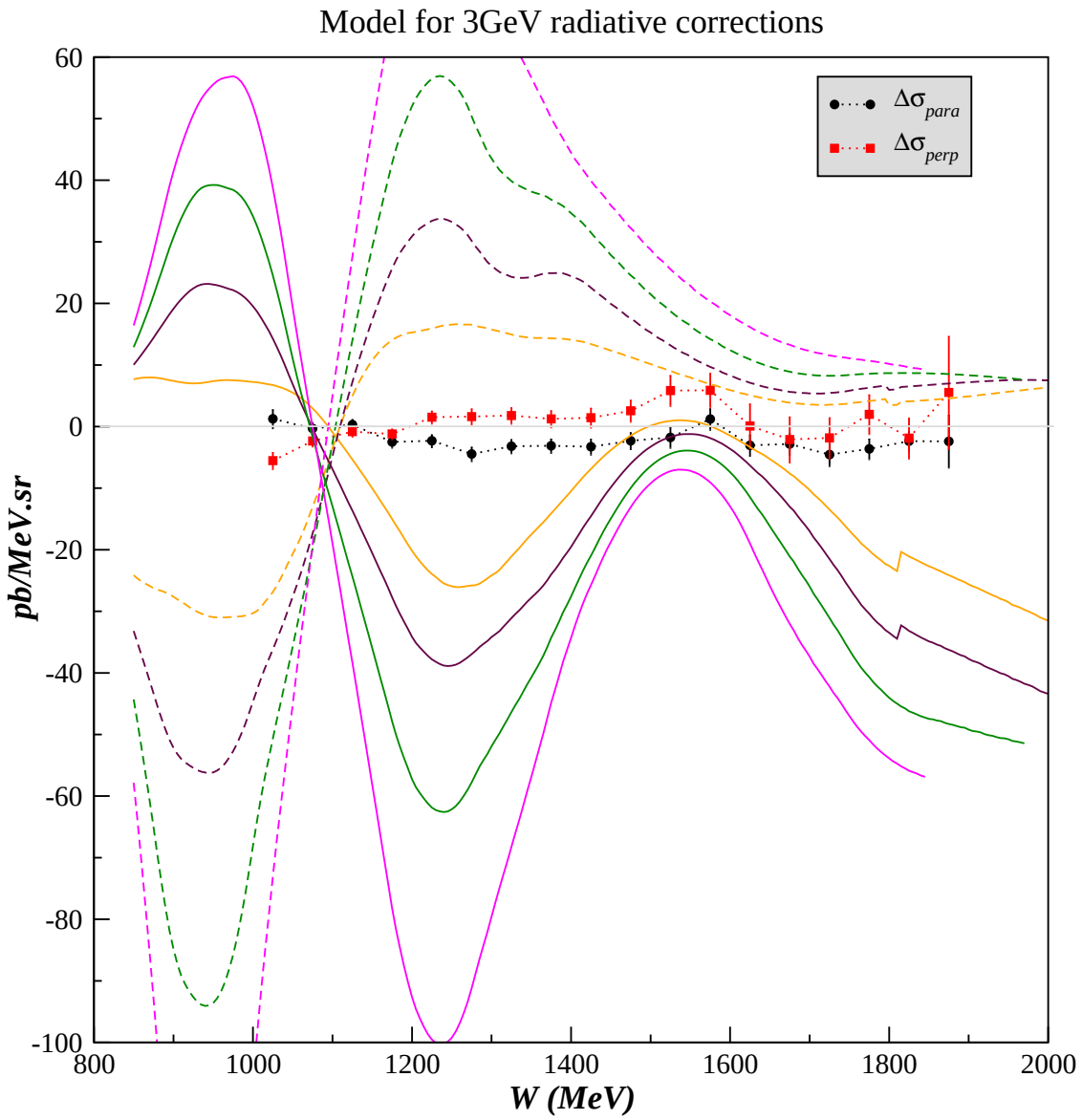
For lowest energy RC, used g_1 and g_2 data from E94-010:

1. interpolate g_1 and g_2 to all (W,Q^2) needed
2. calculate $\Delta\sigma_{||}$ and $\Delta\sigma_{\perp}$ at angles and incident energies needed.

Then used our own data for highest energies.

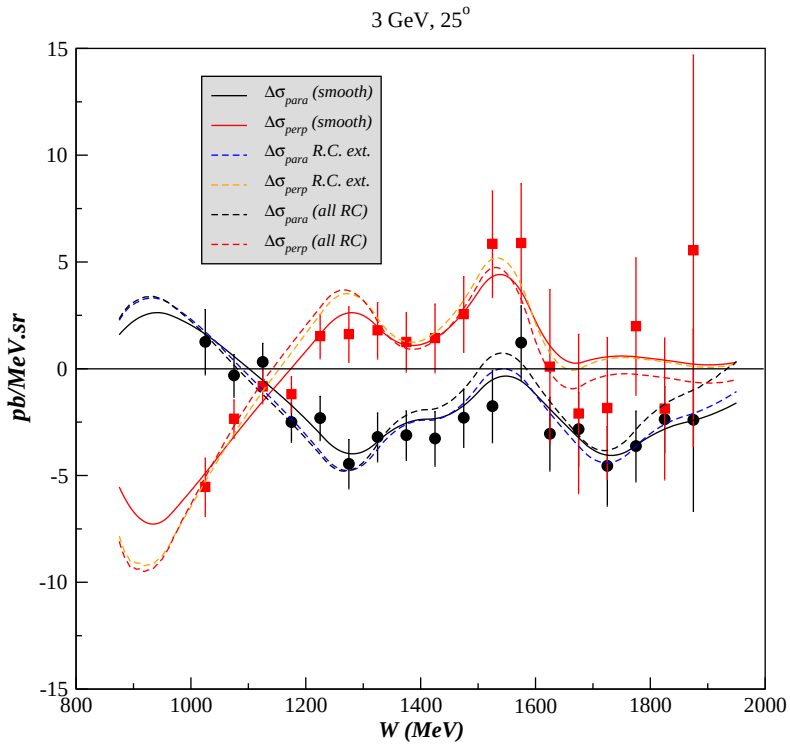


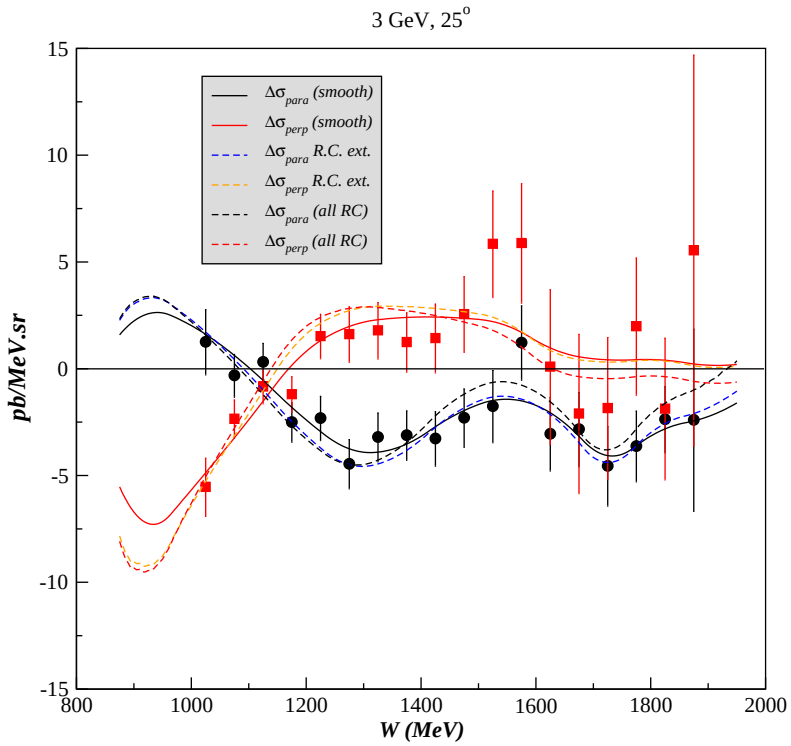


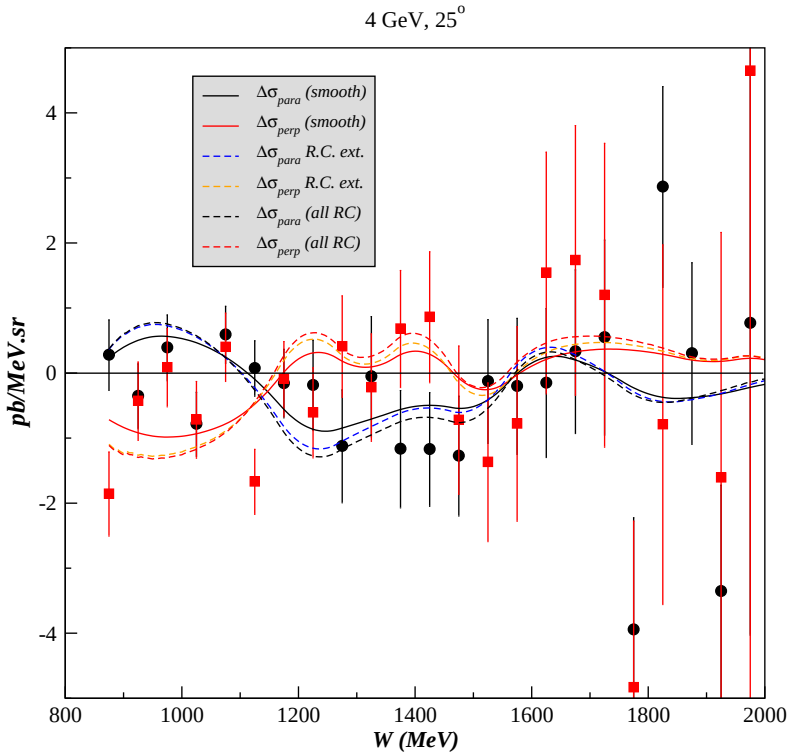

Model for 3GeV radiative corrections
Δσ para
Δσ perp
pb/MeV.sr
W (MeV)
60
40
20
0
-20
-40
-60
-80
-100
800
1000
1200
1400
1600
1800
2000

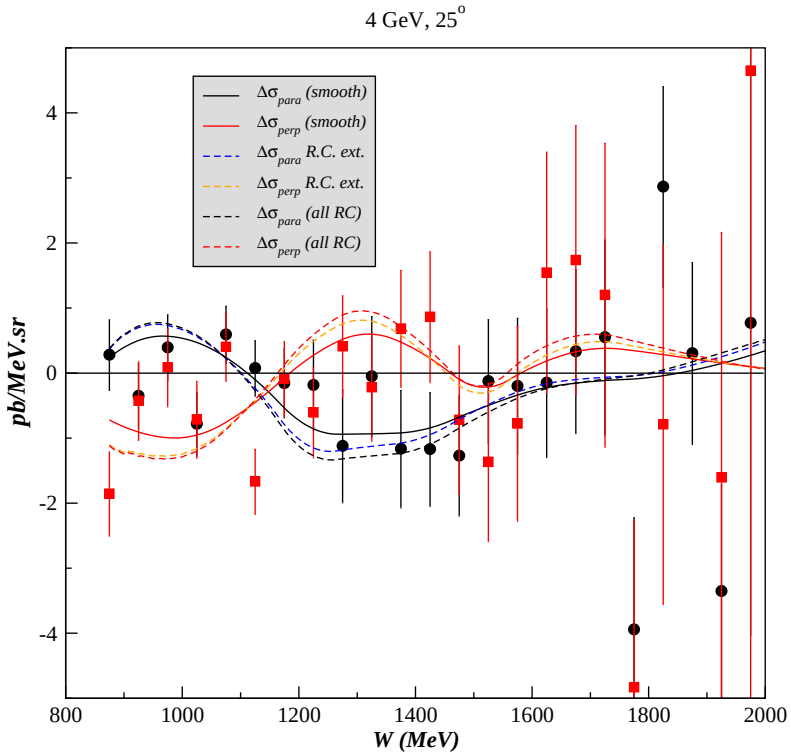
Polarized cross sections

$$\Delta\sigma_{\parallel(\perp)} = 2\ \mathrm{A}^{exp}_{\parallel(\perp)}\sigma_0^{exp} + \mathrm{RC}$$






4 GeV, 25°
Δσpara (smooth)
Δσperp (smooth)
Δσpara R.C. ext.
Δσperp R.C. ext.
Δσpara (all RC)
Δσperp (all RC)
pb/MeV.sr
W (MeV)
4
2
0
-2
-4
800
1000
1200
1400
1600
1800
2000


4 GeV, 25°
Δσpara (smooth)
Δσperp (smooth)
Δσpara R.C. ext.
Δσperp R.C. ext.
Δσpara (all RC)
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4
2
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800
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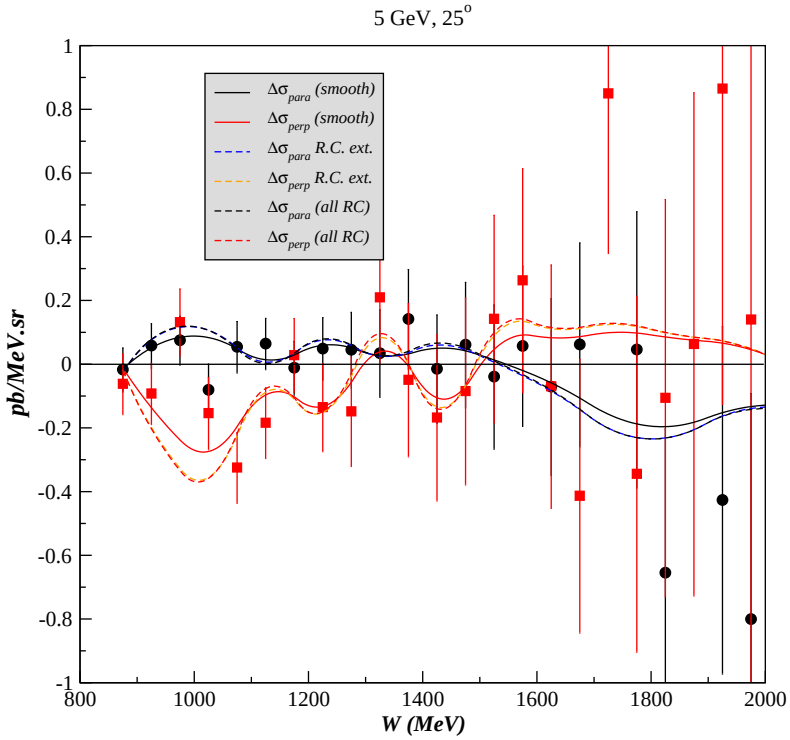
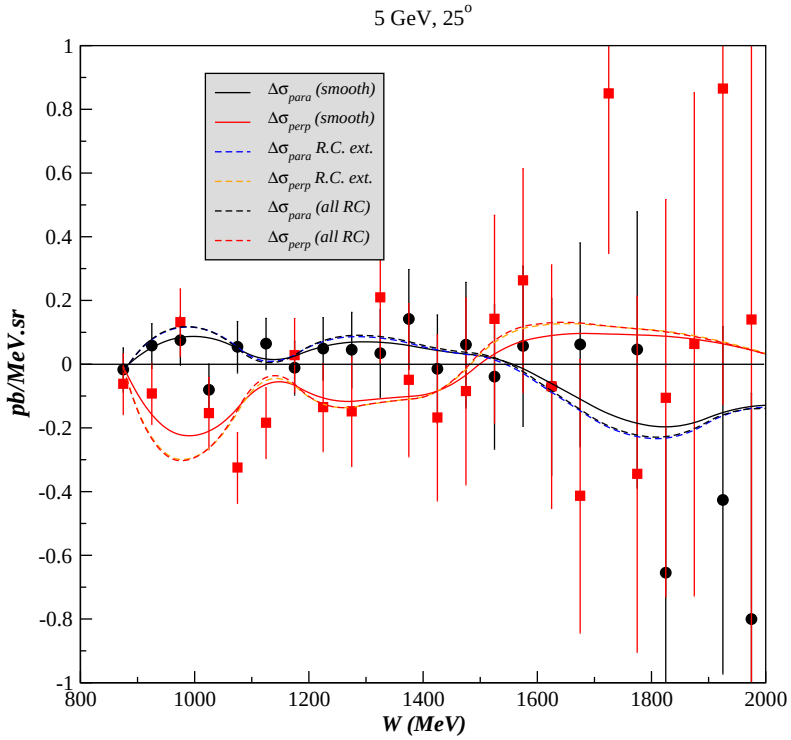
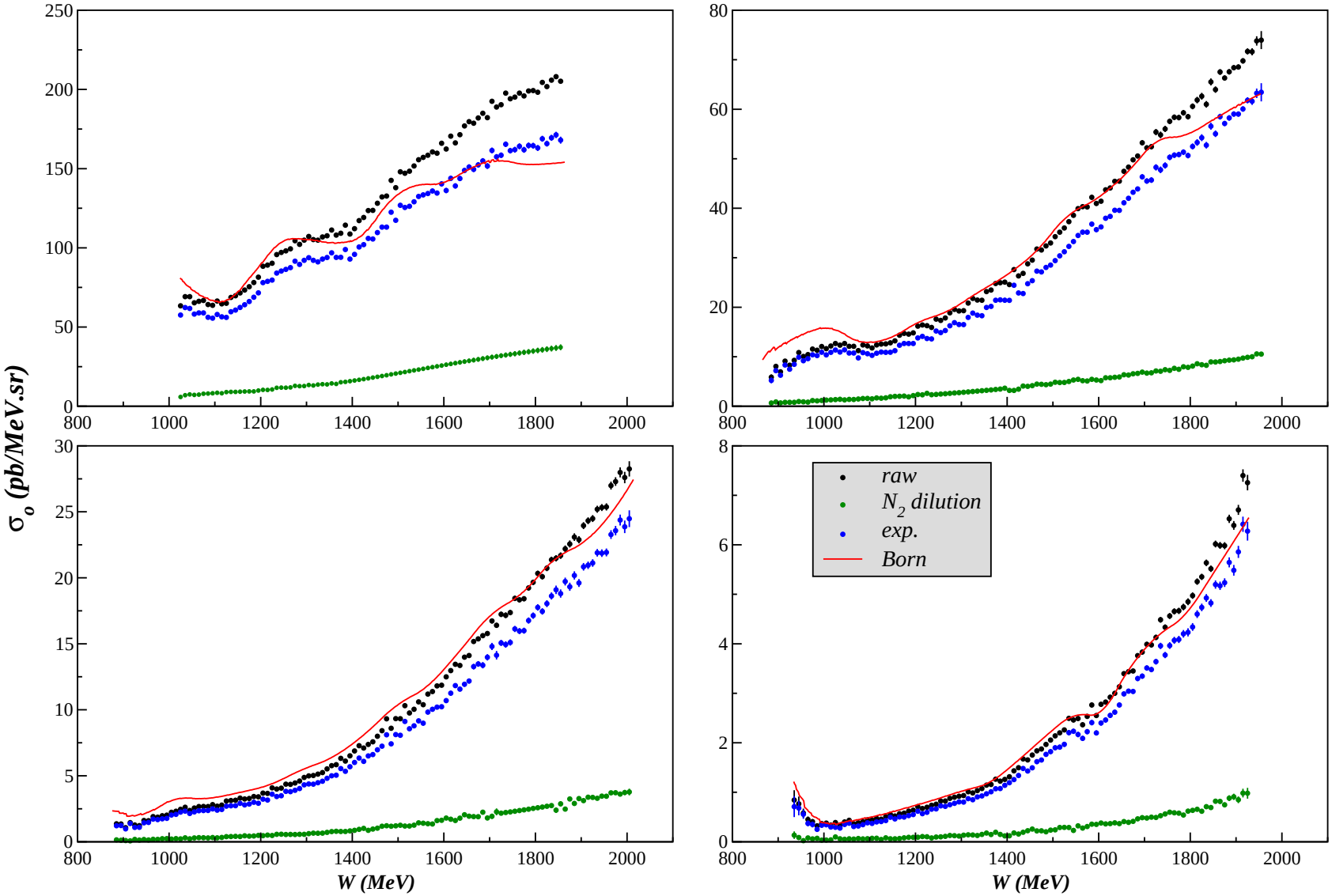

5 GeV, 25°
Δσ para (smooth)
Δσ perp (smooth)
Δσ para R.C. ext.
Δσ perp R.C. ext.
Δσ para (all RC)
Δσ perp (all RC)
pb/MeV.sr
W (MeV)

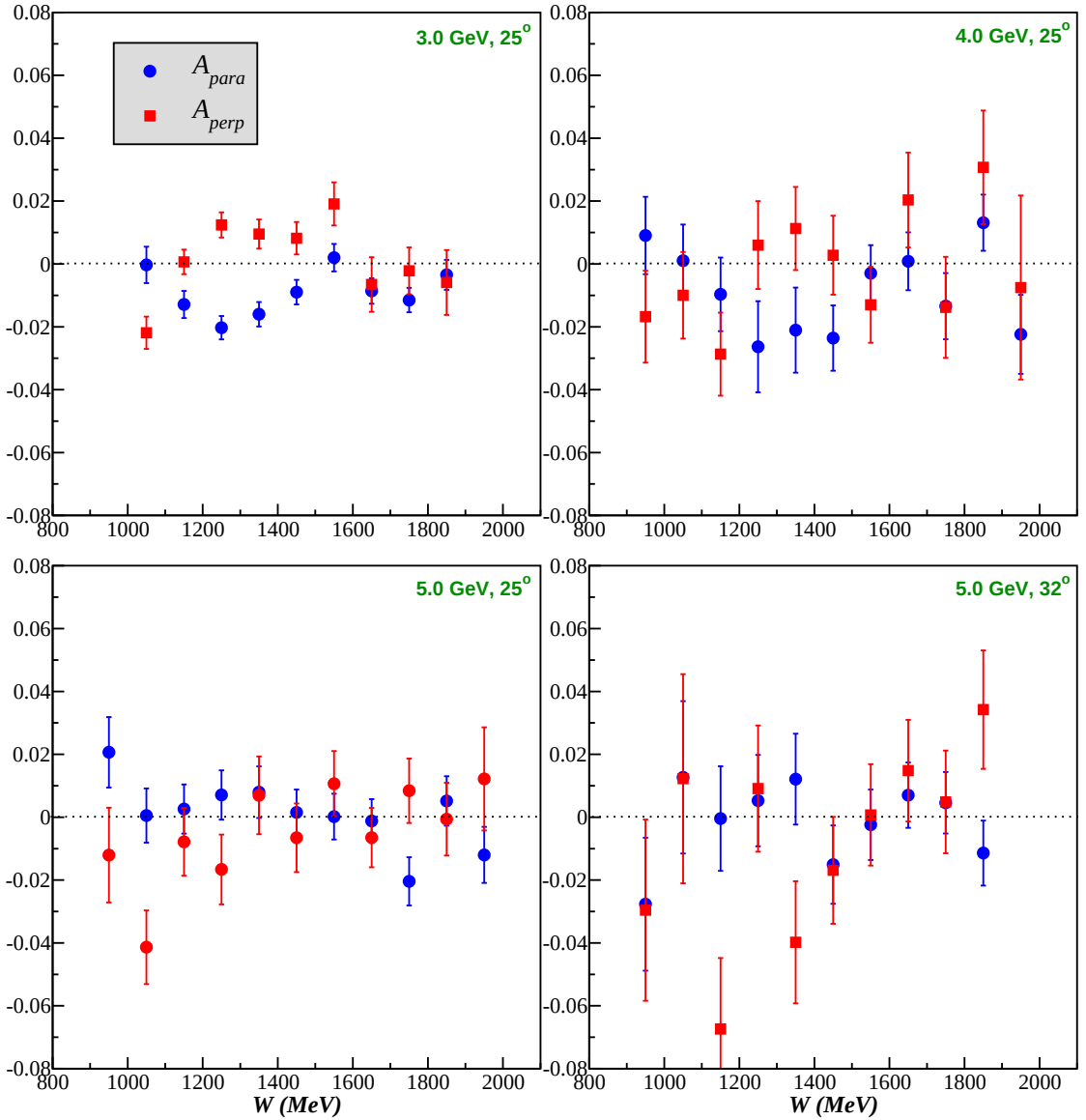

5 GeV, 25°
Δσ para (smooth)
Δσ perp (smooth)
Δσ para R.C. ext.
Δσ perp R.C. ext.
Δσ para (all RC)
Δσ perp (all RC)
pb/MeV.sr
W (MeV)

Unpolarized cross sections: $\sigma_0^{born} = \sigma_0^{raw} - 2\sigma_N(\rho_{N_2}/\rho_{^3\mathrm{He}}) + RC$

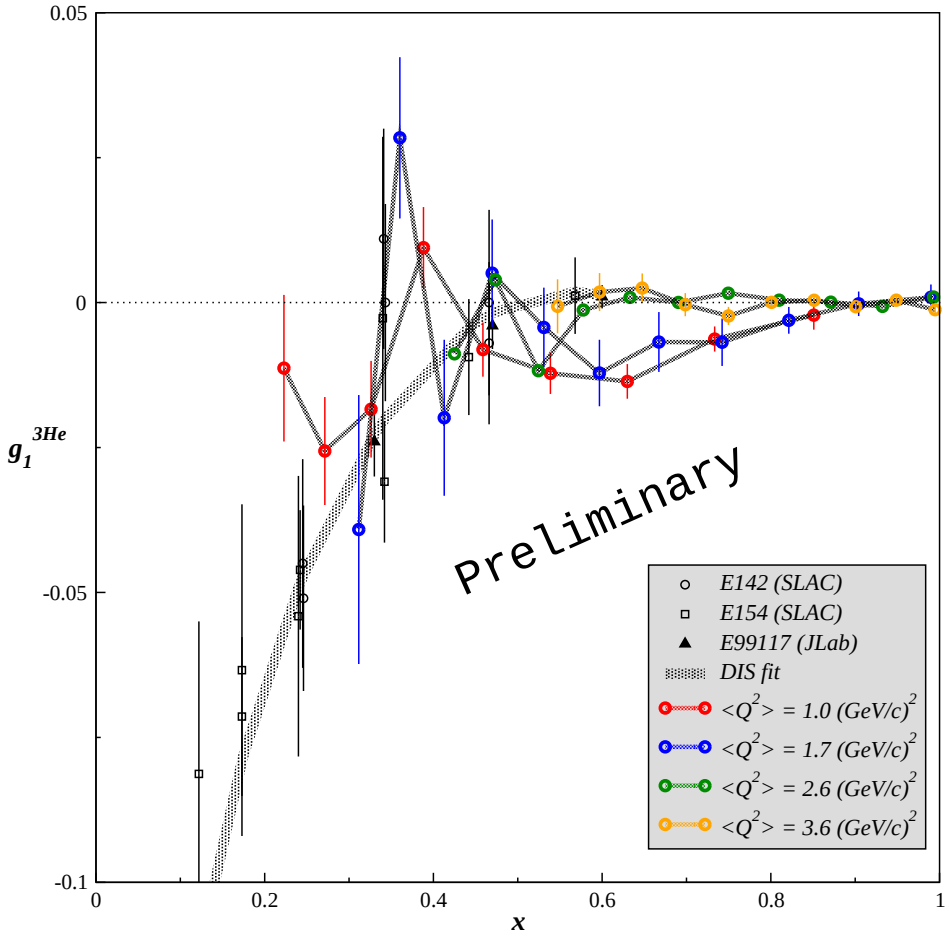
- Subtracted N_2 unpolarized cross sections
- Used QFS as a model for ^{3}He unpolarized cross sections in RADCOR

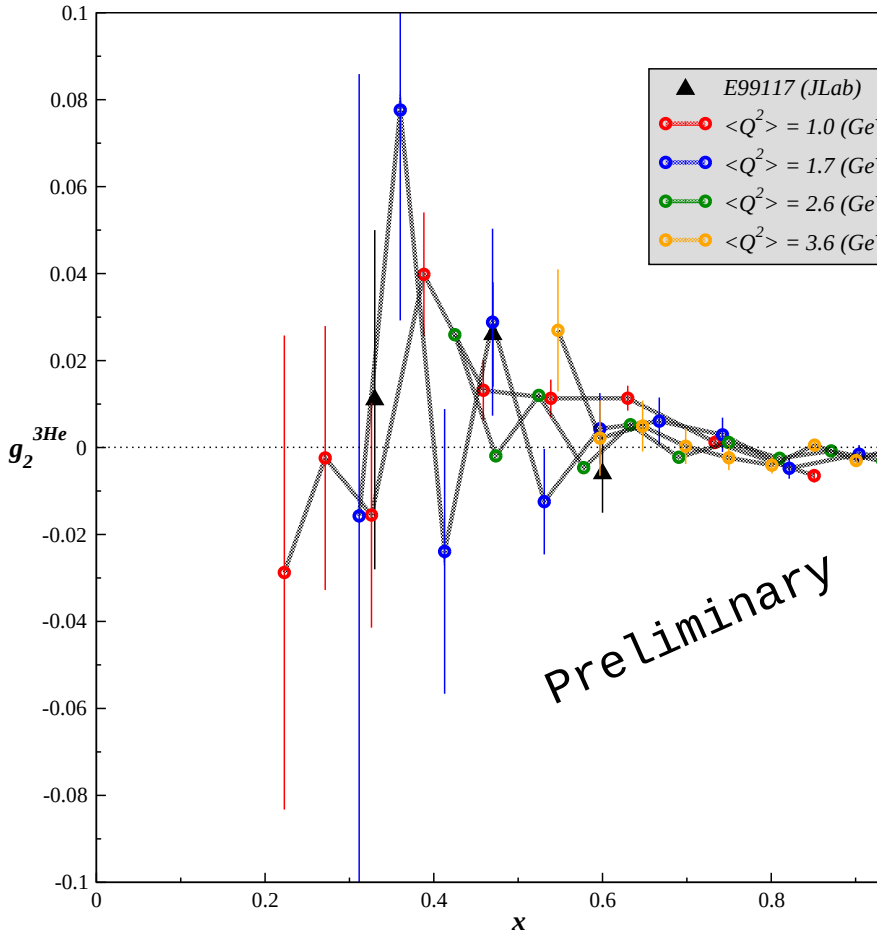


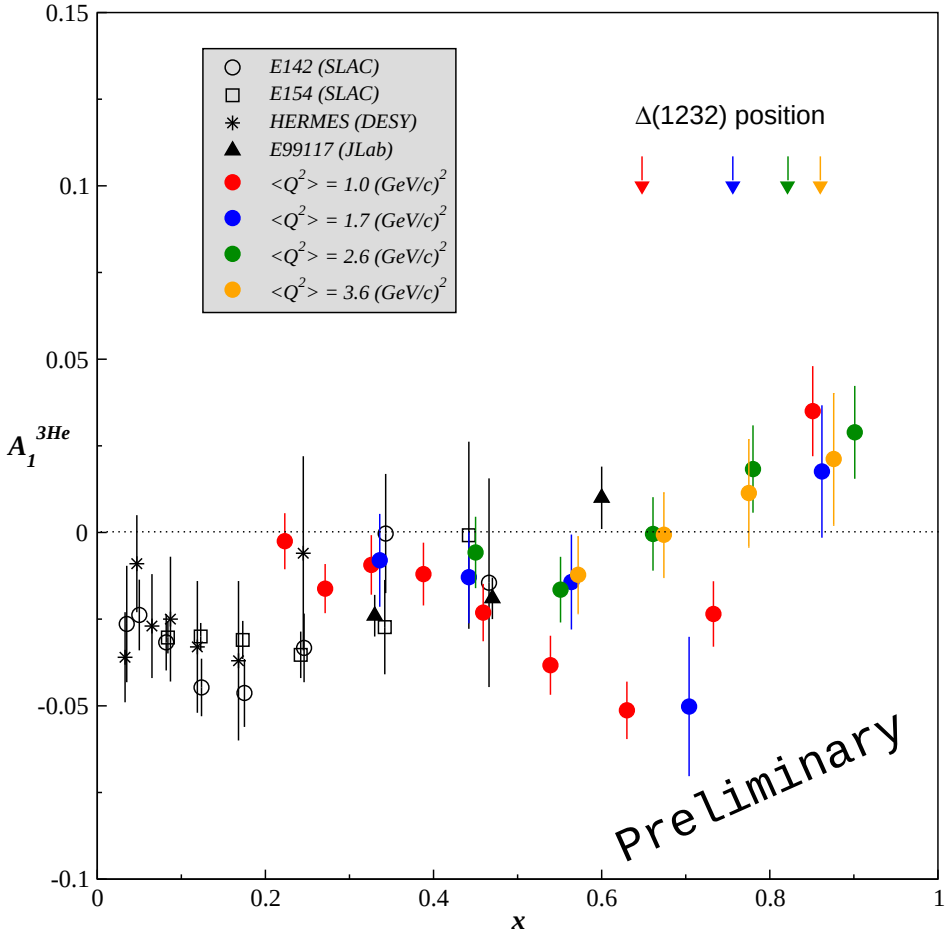
Born asymmetries: $A_{\|(\perp)} = \Delta\sigma_{\|(\perp)}/2\sigma_0^{born}$

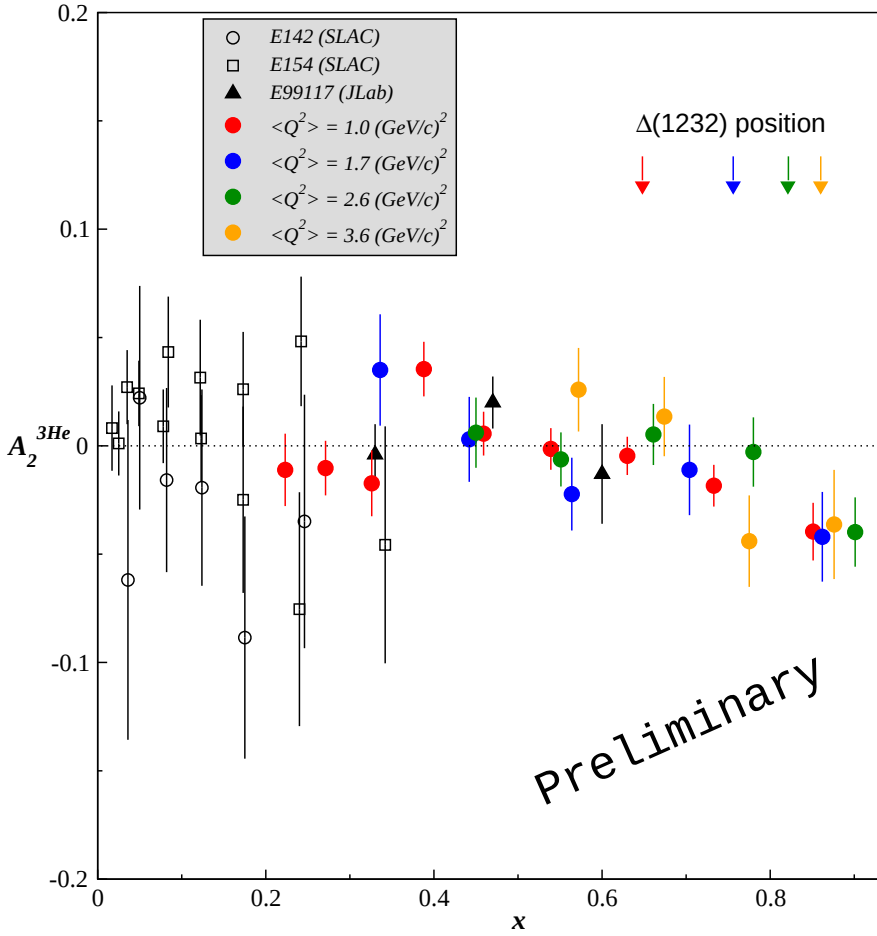


Preliminary results for ^3He






E142 (SLAC)
E154 (SLAC)
HERMES (DESY)
E99117 (JLab)
<Q²> = 1.0 (GeV/c)²
<Q²> = 1.7 (GeV/c)²
<Q²> = 2.6 (GeV/c)²
<Q²> = 3.6 (GeV/c)²
Δ(1232) position
A1 3He
x
Preliminary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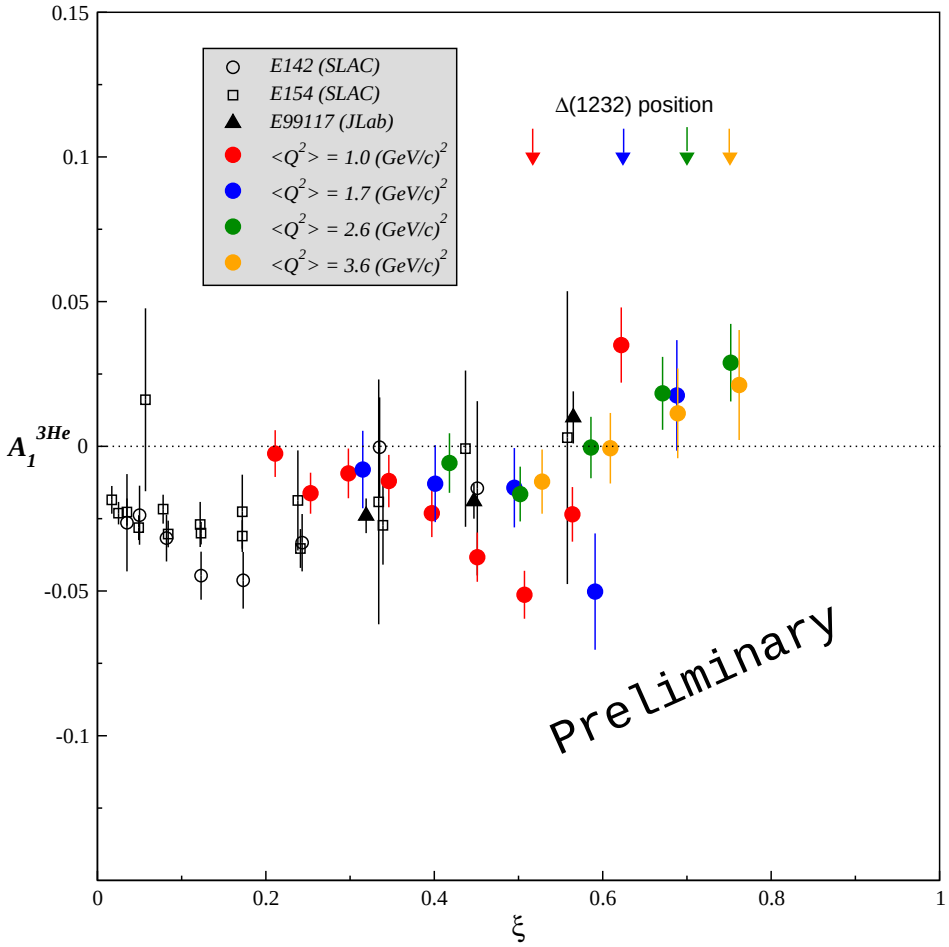
Δ(1232) position
A2 3He
x
Preliminary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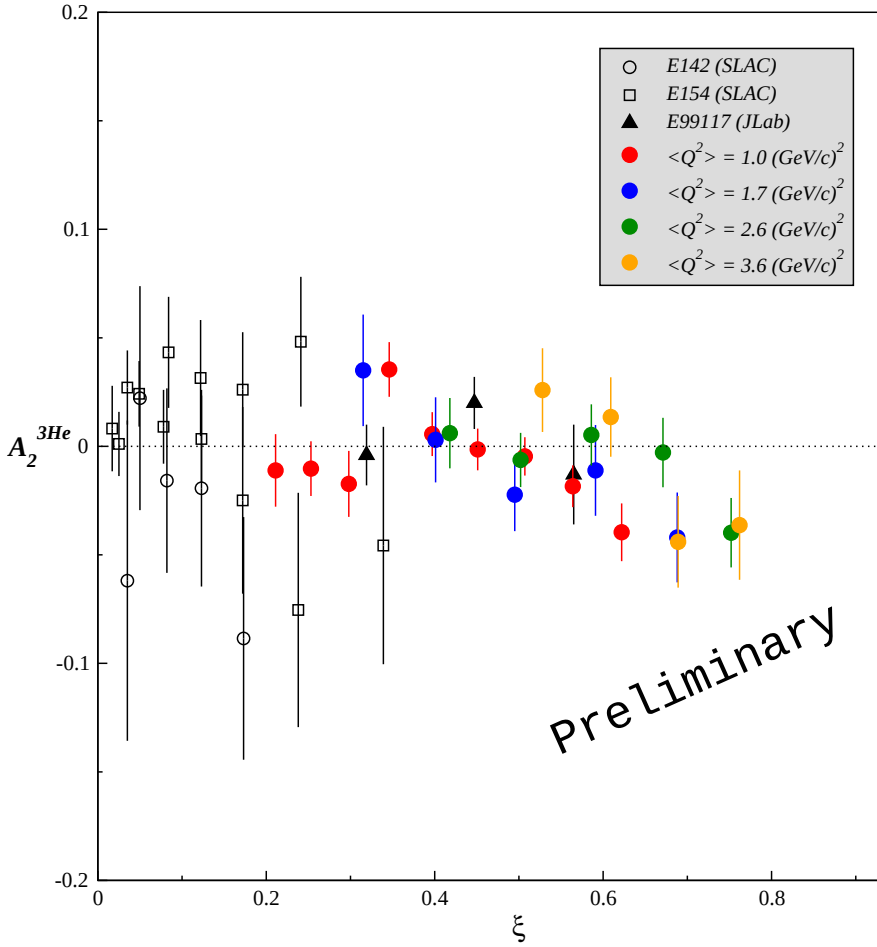
Δ(1232) position
A1 3He
ξ
Preliminary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A2 3He
ξ
Preliminary

Things to check

- Beam energies and bleedthrough
- Density for N_2 and $^3\vec{H}e$ and analyze pressure curve data
- Error calculations
- Low W behavior of σ_0 of kin 6
- Comparison of different binnings.

To do

- → Finalize EPR analysis + EPR for saGDH
- → Radiative corrections on N_2 cross sections
- → 2nd pass radiative corrections:
  1. use E94-010 data instead of QFS for σ_0
  2. study of model dependence for polarized and unpolarized cases
  3. smoothings of the data: evaluation of the uncertainty
- → Ask for Hall C model for R
- → Contact theorists for DIS models
- → Moments and neutron extraction